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Antimicrobial activity of grape seed and skin extracts coated on corona treated LDPE and PET films

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Incorporation of natural bioactive agents in the packaging material to increase the shelf life of meat products is a promising technology. Grapes are of special interest because of their high content of phenolic compounds that have documented antimicrobial and antioxidant properties. The aim of the present work was to investigate grape seed (GSE) and skin (GSKE) extract antibacterial activity through their incorporation into bioactive LDPE/PET films that could be used as food packaging materials for poultry and meat products. Commercial corona treated LDPE and PET were coated with either grape seed or grape skin extract. The Agar Plate Diffusion method was used for the investigation of the antimicrobial properties of both extracts' coated films against E. coli chosen as a Gram-negative bacterium and *Staphylococcus aureus* as a Gram-positive one. LDPE and PET films coated with GSE showed inhibition zones of *E. coli* growth in the range of 16-25 mm, while *Staph. aureus* growth inhibition zones were in the range of 15-20 mm. For LDPE corona films coated with GSE, the minimum inhibitory concentration (MIC) was 0.1 gm for *E. coli* and 0.15 gm for *Staph. aureus*; while for corona treated PET films/GSE, the MIC for both *E. coli* and *Staph. aureus* was 0.1 g/area of regular petri dish. Corona treated LDPE and PET coated with GSKE showed an inhibition zone range of 13-16.3 mm for *E. coli* and 12-20 mm for *Staph. aureus*. For LDPE corona films/GSKE, the minimum inhibitory concentration (MIC) was 0.05 gm for *E. coli* and 0.2 gm for *Staph. aureus*. For corona treated PET films/GSKE, the MIC was 0.1 gm for *E. coli* and 0.15 g for *Staph. aureus*. The total phenolic content of both GSE and GSKE was determined to be 315.32 g (GAE)/kg, and 265.326 g (GAE)/kg for GSE and GSKE respectively, using the Folin-Ciocalteu method. The coated films (LDPE/GSE or LDPE/GSKE), were used to wrap fresh ground chicken patties. TVC, *Pseudomonads, Brochothrix thermosphacta*, Lactic acid bacteria and *Enterobacteriaceae* counts were determined during a storage period of 10 days. Sampling was carried out on day zero, two, four, six, eight, and 10 for test samples and until day eight for controls. There was a reduction in the population of the bacteria tested in the range of 0.2-1.4 log cfu/g in case of GSE, while with GSKE the reduction of bacterial populations range was 0.3-1.95 log cfu/g. Chicken patty microbiological shelf life for the LDPE/GSE samples, LDPE/GSKE samples and control samples was 10, 10 and eight days respectively.

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The feasibility of canola cultivation using GIS and climatic indices

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Agro climatic zoning is one of the solutions to consider suitable planning for application of arable land resources and feasibility of developing an arable system in an area. Producing rain fed crops can develop with minimal risk by studying the climate characteristics. So, by identifying prone areas, spatial distribution and applying appropriate management methods, land production potential can be predicted, and maximum utilization can be achieved. The aim of this study was to determine suitable area for canola cultivation. Therefore, land information, topography (slope, slope direction and height) and meteorological data (type of climate, the average rainfall and the average temperature) of the area were collected and analyzed in GIS environment. Also, suitable temperatures and precipitation probability were prepared to evaluate ecological needs of canola based on the climatic conditions. After preparation, the results of agro climatic zoning showed this study area in dry land areas divided into four groups: 1. suitable group: 75-100 percent probability of optimal conditions with an area of 42.96 percent of the arable land area, 2. middle group: 50-75 percent probability of optimal conditions with an area of 35.38 percent of the arable land area, 3. weak group: 20-50 percent probability of optimal conditions with an area of 21.65 percent of the arable land area and 4. unsuitable group (non-agricultural): with an area of 40.85 percent of the arable land area. According to the acquired results, the most important limiting factor in producing canola is moisture. The next limiting factor is land slope.

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